In conclusion, the writer wishes to thank all those who have given assistance in many ways during the preparation of this paper: Dr. Chilton for his advice and encouragement, without which the paper would not have been undertaken; Mr. James Young and Mr. W. F. Hilson for permission to consult the minute-books of the Domain Boad; Mr. J. B. Armstrong for much valuable information regarding the past history of the Gardens and Park and for the list of native plants; Professor A. Wall for his painstaking search for the native plants now present in the Park; Messrs. J. C. Andersen, R. Speight, W. D. Andrews, and R. M. Laing for help of other kinds.

ART. XXXIX.—*A New Discoglossoid Frog from New Zealand.*

By ALLAN R. MCCULLOCH, Zoologist, Australian Museum.

[*Read before the New Zealand Institute, at Christchurch, 4th–8th February, 1919; received by Editor, 11th February, 1919; issued separately, 26th August. 1919.*]

Plate XXX.

Liopelma hamiltoni n. sp.

General form moderately robust. The width of the head is equal to its length from the tip of the snout to the nuchal constriction. Snout rounded, flattened above; the profile anterior to the nostrils very oblique. Nostril midway between the tip of the snout and the eye. Canthus rostralis moderately distinct; loreal region flat and very oblique. The eye is shorter than the snout, and the diameter of its opening is a little

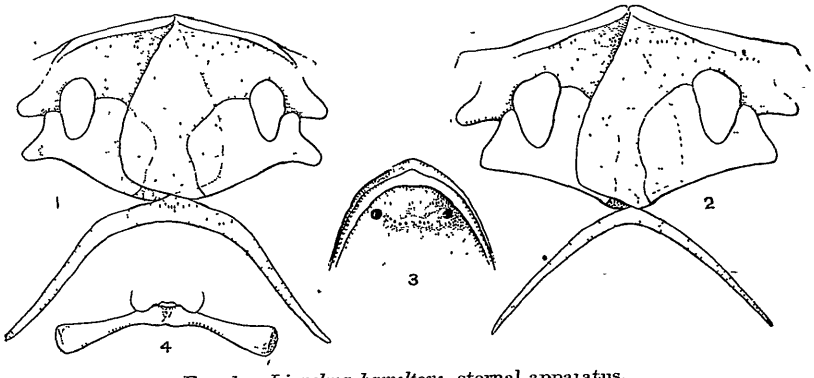

FIG. 1.—*Liopelma hamiltoni*, sternal apparatus.
FIG. 2.—*L. hochstetteri*, sternal apparatus.
FIG. 3.—*L. hamiltoni*, roof of mouth.
FIG. 4.—*L. hamiltoni*, sacral diapophyses.

greater than its distance from the nostril. Narrowest interorbital space about one-third greater than the width of the upper eyelid. No tympanum. A dorso-lateral ridge extends backwards from behind the eye to above the abdomen, and is interrupted above the insertion of the arm. Mandible pointed at the symphysis. Tongue much narrower than in *L. hochstetteri*, its width little more than half that of the mouth; posterior end of the

tongue almost completely united with the floor of the mouth. Vomerine teeth consisting of series of about six granules situated upon two ridges; these are separated on the median line of the palate, and are situated between, or slightly behind, the choanae, as in *L. hochstetteri.*

Fingers longer than in *L. hochstetteri*, the first shorter than the second; each palm with a large inner and a small outer metacarpal tubercle. The tibio-tarsal articulation reaches the nostril when the hind leg is carried forward along the side of the body. Toes longer than in *L. hochstetteri*, webbed at the base; a small, flat inner metatarsal tubercle is present.

Subarticular tubercles of fingers and toes distinct. The skin is nearly everywhere smooth, though there are some scattered tubercles on the proximal portions of the thighs and shanks. No omosternum; sternum (fig. 1) two slender diverging cartilaginous styles, and of similar formation to *L. hochstetteri* (fig. 2); the left epicoracoid cartilage overlaps the right in both species. Diapophyses of sacral vertebra (fig. 4) subcylindrical basally, and slightly expanded distally. Short ribs articulate with the anterior diapophyses.

Colour.—Light brown in life, with irregular darker and lighter marbling on the upper surfaces. A black band extends from the tip of the snout to the nostril and thence to the eye; it is continued backwards towards the sides below the dorso-lateral ridge. The limbs are marked with oblique black cross bands, which are most prominent on the thighs. Under-surfaces with greyish mottlings.

The foregoing description is based upon a specimen 42 mm. long from the snout to the vent; it is the example figured in Plate XXX, and is selected as the holotype. A second specimen about the same size, and collected with the first, was dissected to examine the internal characters.

Variation.—Two other examples, received in alcohol, differ only in being somewhat more uniformly coloured, their black markings being more or less obscure.

Identity.—This species differs from *L. hochstetteri* not only in its more slender form, but in having much longer fingers and toes, the webs of which are more reduced than in that species. The tongue is narrower and not so free posteriorly.

The holotype and paratype are deposited in the Dominion Museum, Wellington.

Habitat.—Stephen Island, Cook Strait.

I am indebted to Dr. J. Allan Thomson for the privilege of describing this interesting new species, which is named after its discoverer, Mr. Harold Hamilton

SUPPLEMENTARY NOTE BY CHARLES HEDLEY, F.L.S., AUSTRALIAN MUSEUM.

This interesting addition to the fauna of New Zealand was discovered by Mr. Harold Hamilton on Stephen Island, at the north-west extremity of Cook Strait. This small island is also noteworthy as a refuge of the tuatara, or *Sphenodon.* Dr. J. Allan Thomson subsequently visited the island and obtained further material. After several days of fruitless search, fourteen specimens were found crowded under a large heap of stones. As it was in July, Dr. Thomson suggested that this party may have been hibernating. During the winter there are a few streams on the island, but in summer all the surface water disappears. This suggested to Dr. Thomson that possibly the *Liopelma* is viviparous. On the other hand,

[*Phyllis F. Clark del.*

Liopelma hamiltoni n. sp.

Face p. 448.]

some interesting modifications in the development of this frog may occur, such as is exhibited by the Australian *Pseudophryne*,* of which the hatching of the ova may be postponed for a period of at least three months when dry conditions prevail.

According to A. S. Thomson,† *L. hochstetteri* also hides under stones. He found that it was so rare and of such retiring (perhaps nocturnal) habits that even the Maoris were not acquainted with it. Possibly this habit of close concealment was engendered by escaping from the voracity of the moas.

The vertebrate fauna of New Zealand has always been regarded as one of fascinating interest. At the first glance the poverty of reptiles and the complete absence of mammals appear to indicate that New Zealand has never held direct intercourse with any continent—that, in biological phrase, New Zealand is "oceanic" rather than "continental." Such a conclusion is, however, vigorously combated both by the fauna as a whole and by the varied and well-developed flora. "No other country on the globe," wrote Wallace, "has such an extraordinary set of birds." And returning to the reptiles, though the brief records enumerate no snakes and only one frog and fourteen lizards, yet the presence of the *Sphenodon* alone confers on the New Zealand fauna a distinction lacking in many with a far longer roll-call.

Thus the quality of the New Zealand reptilian fauna makes amends for its quantity, and establishes the fact that land communication once really did exist between it and the outside world. But the old fashion of those few inhabitants implies that the date of such traffic was a remote one. When large problems depend for their solution upon scanty data, science is athirst for every drop of information, and so the discovery of a second indigenous frog is of special interest.

The discoglossoid frogs form a small, compact group remarkable for their primitive structure and for a disconnected distribution, discordant with usual faunistic associations. Stejneger‡ considers that their original home was to the south-east of the Himalayas, and that in early Cretaceous times the discoglossoids radiated thence to New Zealand, to western America, and to western Europe. But central Asia can have had no relations or direct communication with New Zealand. As the mass of the Australian Amphibia arrived there from South America via Antarctica, it is now suggested that, whether originally Asiatic or Neotropical, *Liopelma* had a similar history. Together both the frog faunas of Australia and of New Zealand might have arisen in South America, both escaped by a southern outlet—the one to New Zealand, the other to Australia—and by the eastern door of "Arch-helenis" both may have been admitted to the Mediterranean region by way of north-west Africa, and thence to Asia. But the difference between the Discoglossidae of New Zealand on the one hand and the Australian Hylidae and Cystignathidae on the other would then imply that the different migrations flowed at different periods and perhaps by different channels to New Zealand and to Tasmania respectively.

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* J. J. Fletcher, *Proc. Linn. Soc. N. S. Wales*, vol. 2, p. 379, 1889.
† A. S. Thomson, *Edinburgh New Philos. Journal*, vol. 55, pp. 66–69, 1853.
‡ L. Stejneger, *Bull. Am. Geogr. Soc.*, vol. 37, p. 9. 1905.